

Remarks

The Office Action mailed August 3, 2005 has been carefully reviewed and the foregoing remarks have been made in consequence thereof.

Claims 1- 4, 6-11, and 13-20 are now pending in this application. Claims 1-4, 6-11, and 13-19 stand rejected. Claims 5, 12, 15-18, and 20 stand objected to. Claims 5 and 12 have been canceled.

The objection to Claims 15-18 is respectfully traversed. Specifically, Applicants have amended Claim 13 to provide proper antecedent basis for the recitation within Claim 15 of "first and second primary dilution openings." Moreover, Applicants have amended Claim 16 to remove references to the omitted term "openings". Claims 17 and 18 depend from Claim 16. Accordingly, for at least the reasons set forth above, Applicants respectfully request the objections to Claims 15-18 be withdrawn.

The rejection of Claim 18 under 35 U.S.C. § 112 is respectfully traversed. Specifically, Claim 18 has been amended to more clearly recite the orientation of the openings with respect to a centerline of the swirler. Accordingly, for at least the reasons set for above, Applicants respectfully request the Section 112 rejections of Claim 18 be withdrawn.

The rejection of Claims 1, 6, 7, 13 and 14 under 35 U.S.C. § 102(b) as being anticipated by either Scott (U.S. Pat. No. 4,567,730) or Snyder (U.S. Pending Patent Application No. 2002/0116929) is respectfully traversed.

Scott describes a combustor (10) for a turbine engine. The combustor includes an inner liner (34) and an outer liner (32). The inner liner is spaced radially inward from an inner supporting shell (28) and the outer liner is spaced radially inward from an outer supporting shell (26). The outer and inner support shells each include a plurality of cooling air apertures (42) for channeling impingement cooling air (44) towards an outer surface of each respective liner. The outer and inner liners each include a plurality of air apertures (48) that direct dilution air (50) into a combustion zone (20) defined between the outer and inner liners. Notably, Scott does not describe nor suggest that a pressure differential across the impingement openings is substantially equal to a pressure differential across the at least one

row of dilution openings. Moreover, Scott does not describe nor suggest a row of first primary dilution openings and a row of second primary dilution openings, which are oriented such that each of the second primary dilution openings is downstream from and between each of the first primary dilution openings.

Snyder describes a combustor (14) for a turbine engine. The combustor includes an inner liner (32) and an outer liner (34). The outer liner is spaced radially inward from an outer support shell (44) and the inner liner is spaced radially inward from an inner support shell (58). The outer and inner support shells each include a plurality of impingement cooling holes (70) for channeling impingement cooling air towards an outer surface of each respective liner. The outer and inner liners each include a plurality of dilution air holes (114 and 112, respectively) that direct dilution air into a combustion zone (36) defined by the inner and outer liners. The row (114) dilution air holes formed in the outer liner includes a circumferentially-aligned first set of openings (116) and a second set of openings (118). The first set of openings (116) each have a diameter that is larger than a diameter of each of the second set of openings. Notably, Snyder does not describe nor suggest that a pressure differential across the impingement openings is substantially equal to a pressure differential across the at least one row of dilution openings. Moreover, Snyder not describe nor suggest a row of first primary dilution openings and a row of second primary dilution openings, that are oriented such that each of the second primary dilution openings is downstream from and between each of the first primary dilution openings.

Claim 1 recites a method for assembling a combustor for a gas turbine engine, wherein the method comprises “coupling an inner liner to an outer liner . . . positioning an outer support a distance radially outward from the outer liner . . . positioning an inner support a distance radially inward from the inner liner . . . forming at least two rows of impingement openings extending through at least one of the inner support and the outer support for channeling impingement cooling air therethrough . . . forming at least one row of dilution openings extending through at least one of the inner liner and the outer liner for channeling dilution cooling air therethrough . . . such that a pressure differential across the at least two rows of impingement openings is substantially equal to a pressure differential across the at least one row of dilution openings.”

Neither Scott nor Snyder describe nor suggest a method of assembling combustor as is recited in Claim 1. Specifically, neither Scott nor Snyder describe nor suggest forming a combustor including at least two rows of impingement openings and at least one row of dilution openings formed such that a pressure differential across the at least two rows of impingement openings is substantially equal to a pressure differential across the at least one row of dilution openings. Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Scott and Snyder.

Claim 6 recites a combustor for a gas turbine engine, wherein the combustor comprises “an inner liner an outer liner coupled to said inner liner an outer support radially outward from said outer liner an inner support radially inward from said inner liner at least one of said inner support and said outer support comprising at least two rows of impingement openings at least one of said inner liner and said outer liner comprising at least one row of dilution openings extending therethrough a pressure differential across said at least two rows impingement openings is substantially equal to a pressure differential across said at least one row of dilution openings and said plurality of film cooling openings.”

Neither Scott nor Snyder describe nor suggest a combustor as is recited in Claim 6. Specifically, neither Scott nor Snyder describe nor suggest a combustor including at least two rows of impingement openings and at least one row of dilution openings formed such that a pressure differential across the at least two rows of impingement openings is substantially equal to a pressure differential across the at least one row of dilution openings. Accordingly, for at least the reasons set forth above, Claim 6 is submitted to be patentable over Scott and Snyder.

Claim 7 depends from independent Claim 6. When the recitations of Claim 7 are considered in combination with the recitations of Claim 6, Applicants submit that dependent Claim 7 likewise is patentable over Scott and Snyder.

Claim 13 recites a gas turbine engine comprising “a combustor comprising at least one injector, an inner liner, an outer liner, an outer support, and an inner support at least one of said inner support and said outer support comprising at least two rows of impingement openings at least one of said inner liner and said outer liner comprising at least one row

of dilution openings extending therethrough said at least one row of dilution openings comprises at least a row of first primary dilution openings and a row of second primary dilution openings, each of said second primary dilution openings is downstream from and between each of said first primary dilution openings.”

Neither Scott nor Snyder describe nor suggest a combustor as is recited in Claim 13. Specifically, neither Scott nor Snyder describe nor suggest a combustor including at least two rows of impingement openings and at least one row of dilution openings that includes at least a row of first primary dilution openings and a row of second primary dilution openings, wherein each of said second primary dilution openings is downstream from and between each of the first primary dilution openings. Accordingly, for at least the reasons set forth above, Claim 13 is submitted to be patentable over Scott and Snyder.

Claim 14 depends from independent Claim 13. When the recitations of Claim 14 are considered in combination with the recitations of Claim 13, Applicants submit that dependent Claim 13 likewise is patentable over Scott and Snyder.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1, 6, 7, 13, and 14 be withdrawn.

The rejection of Claims 2-4, 8-11, 15-17, and 19 under 35 U.S.C. § 102(b) as being anticipated by Snyder is respectfully traversed.

Snyder is described above. With respect to Claims 2-4, Claims 2-4 depend from independent Claim 1 which recites a method for assembling a combustor for a gas turbine engine, wherein the method comprises “coupling an inner liner to an outer liner positioning an outer support a distance radially outward from the outer liner positioning an inner support a distance radially inward from the inner liner forming at least two rows of impingement openings extending through at least one of the inner support and the outer support for channeling impingement cooling air therethrough forming at least one row of dilution openings extending through at least one of the inner liner and the outer liner for channeling dilution cooling air therethrough such that a pressure differential across the at least two rows of impingement openings is substantially equal to a pressure differential across the at least one row of dilution openings.”

Snyder does not describe nor suggest a method of assembling combustor as is recited in Claim 1. Specifically, Snyder does not describe nor suggest forming a combustor including at least two rows of impingement openings and at least one row of dilution openings formed such that a pressure differential across the at least two rows of impingement openings is substantially equal to a pressure differential across the at least one row of dilution openings. Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Snyder.

Claims 2-4 depend from independent Claim 1. When the recitations of Claims 2-4 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-4 likewise are patentable over Snyder.

Claims 8-11 depend from Claim 6 which recites a combustor for a gas turbine engine, wherein the combustor comprises "an inner liner an outer liner coupled to said inner liner an outer support radially outward from said outer liner an inner support radially inward from said inner liner at least one of said inner support and said outer support comprising at least two rows of impingement openings at least one of said inner liner and said outer liner comprising at least one row of dilution openings extending therethrough a pressure differential across said at least two rows impingement openings is substantially equal to a pressure differential across said at least one row of dilution openings and said plurality of film cooling openings."

Snyder does not describe nor suggest a combustor as is recited in Claim 6. Specifically, Snyder does not describe nor suggest a combustor including at least two rows of impingement openings and at least one row of dilution openings formed such that a pressure differential across the at least two rows of impingement openings is substantially equal to a pressure differential across the at least one row of dilution openings. Accordingly, for at least the reasons set forth above, Claim 6 is submitted to be patentable over Snyder.

Claims 8-11 depend from independent Claim 6. When the recitations of Claims 8-11 are considered in combination with the recitations of Claim 6, Applicants submit that dependent Claims 8-11 likewise are patentable over Snyder.

Claims 15-17 and 19 depend from independent Claim 13 which recites a gas turbine engine comprising “a combustor comprising at least one injector, an inner liner, an outer liner, an outer support, and an inner support at least one of said inner support and said outer support comprising at least two rows of impingement openings at least one of said inner liner and said outer liner comprising at least one row of dilution openings extending therethrough said at least one row of dilution openings comprises at least a row of first primary dilution openings and a row of second primary dilution openings, each of said second primary dilution openings is downstream from and between each of said first primary dilution openings.”

Snyder does not describe nor suggest a combustor as is recited in Claim 13. Specifically, Snyder does not describe nor suggest a combustor including at least two rows of impingement openings and at least one row of dilution openings that includes at least a row of first primary dilution openings and a row of second primary dilution openings, wherein each of said second primary dilution openings is downstream from and between each of the first primary dilution openings. Rather, in contrast to the invention, Snyder describes a combustor including a row of dilution holes including a circumferentially-aligned first set of openings and a second set of openings that are smaller than the first set of openings. Accordingly, for at least the reasons set forth above, Claim 13 is submitted to be patentable over Snyder.

Claims 15-17 and 19 depend from independent Claim 13. When the recitations of Claims 15-17 and 19 are considered in combination with the recitations of Claim 13, Applicants submit that dependent Claims 5-17 and 19 likewise are patentable over Snyder.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 2-4, 8-11, 15-17, and 19 be withdrawn.

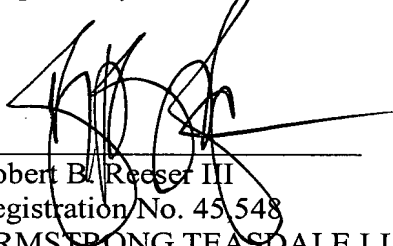
Claims 5, 12, and 20 were indicated as allowable if rewritten in independent form. Claim 5 has been canceled and independent Claim 1 has been amended to include the recitations of Claim 5. Accordingly, Claim 1 is submitted to be in condition for allowance.

Claim 12 has been canceled and independent Claim 6 has been amended to include the recitations of Claim 12. Accordingly, Claim 6 is submitted to be in condition for allowance.

Claim 20 depends from independent Claim 13 which is submitted to be in condition for allowance. When the recitations of Claim 20 are considered in combination with the recitations of Claim 13, Applicants submit that Claim 20 likewise is in condition for allowance.

In view of the foregoing amendments and remarks, all the claims now active in the application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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